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ABSTRACT

Studies have suggested that field independent (FI) dental dents perform better in pre-clinical laboratory courses than field dependent (FD) students. A study was conducted to determine the relationship of cognitive learning style to academic performance with 66 second year dental students at Virginia Commonwealth University (Richmond). A brief demographic questionnaire and the Group Embedded Figures Test (GEFT) were administered to the students who had completed three pre-clinical courses containing laboratory components which required demonstration of psychomotor skills. Pre-clincial grades based on laboratory projects requiring pscychomotor skills were also gathered. Results indicated that: (1) students as a whole were field independent; and (2) there were no statistically significant gender, race, or ethnic differences concerning cognitive style. However, a statistically significant relationship existed between the Group Embedded Figures Test scores and preclinical course grades, and also between student handedness (right versus left hand dominance) and cognitive style. Students who were ranked upper third of the class by course grades were the most field independent learners. Right handed students were more field independent than left handed students. Dental educators can identify FD students through the GEFT and institute program changes to meet their learning needs. Seven references and one figure are included. (Author/LPT)

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# THE RELATIONSHIP OF COGNITIVE STYLE TO ACADEMIC PERFORMANCE AMONG DENTAL STUDENTS

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## ABSTRACT

This study is concerned with the cognitive style of dental students and its relationship to their academic performance. A brief questionnaire was administered to obtain student demographic information. The Group Embedded Figures Test was used to assess students' cognitive style. Pre-clinical grades bases on laboratory projects requiring psychomotor skills were also gathered. Results indicated that students as a whole were field independent. There were no statistically significant gender, race or ethnic differences concerning cognitive style. A statistically significant relationship existed between the Group Embedded Figures Test scores and preclinical course grades. Students who were ranked in the upper third of the class by course grades were the most field independent learners. Additionally, a statistically significant relationship existed between student handedness (right vs left hand dominance) and cognitive style. Right handed students were more field independent.

INTRODUCTION

The shifting of our student population to a more culturally diverse group of adults is resulting in educators interacting with students who learn in different ways. Because of these differences it seems plausible that educational institutions must become more flexible and willing to expand the way information is taught and learned. Teachers may have confused differences in cognitive style with differences in ability thereby attributing poor academic performance to lack of skills.

Traditional methods of instruction and evaluation seem to have favored and benefited those learners who possessed a particular cognitive style viz., a field independent cognitive style. Shade (1982) reported that students are most successful if their information processing included an attention style that was task rather than people orientated; a perceptual style that picks out embedded but important information from distracting influences; attention to verbal cues over nonverbal ones; and an analytical thinking style that facilitates abstract and logical thinking. Witkin (1981) also reported that a field independent cognitive style was related to a more differentiated and analytical perceptual processing of information and a preference to work with things rather that people.

Studies have suggested that field independent (FI) dental students perform better in pre-clinical laboratory courses than field dependent (FD) students. A group of dental students were tested using the Group Embedded Figures Test (GEFT) and the Inverted Tracing Test (ITT) to determine if these tests were better

predictors of performance in dental school that the Dental Admission Test (DAT). Multiple regression analysis revealed that the GEFT and ITT results compared more closely with clinical grades that the DAT. Shortcomings of the standard tests were discussed and it was suggested that the problems of decline in the number of dental school applicants and greater attrition rates of students could be partially reduced through the use of these tests (Suddick et al., 1982). Witkin et al. (1977) studied a group of 1548 students through college into graduate or professional school. The GEFT was administered at college entry. It was observed that FI students preferred impersonal domains requiring cognitive restructuring skills such as the sciences, while FD students favored interpersonal domains such as elementary education. Students whose initial choices were not compatible with their cognitive style tended to shift to a more compatible domain by college graduation or graduate school. Students whose initial choices more closely matched their cognitive style tended to remain in their initial choice. A tendency was observed for students whose choice matched their cognitive style to do better than students whose cognitive style was incongruent with their career choice.

The present study is concerned with the cognitive learning style of students enrolled in the dental program at Virginia Commonwealth University in Richmond.

More specifically, the goals of the research are:

1. To determine if there is a preferred cognitive learning style among students.
2. To describe any relationship that may exist between student style and performance in pre-clinical courses.
3. To determine if a particular cognitive style is associated with the mastery of psychomotor skills.

METHOD

Subjects: Second year (D-2) dental students were selected from the dental program at Virginia Commonwealth University. These students have completed three pre-clinical courses each containing a laboratory component requiring demonstration of a psychomotor skill.

Instruments: A brief questionnaire was administered to obtain student demographic information regarding age, gender, race, etc. The Group Embedded Figures Test (GEFT) was used to assess students' cognitive learning styles. The test ranges from 0 to a maximum score of 18 with higher scores (above 9) indicating a field independent cognitive style and lower scores (below 9) indicating a field dependent cognitive style (Witkin et al., 1971).

Procedure: The D-2 students were surveyed and assessed as a group. Students were asked to complete the brief questionnaire first. Immediately following the completion of the survey one of the researchers distributed the GEFT booklets to students while a second researcher read the instructions for taking the instrument

to the group. The entire procedure took approximately 40 minutes at which time students were thanked and dismissed.

Students were ranked in each of the three pre-clinical courses according to their laboratory grades (upper third vs lower third). Additionally, students were classified by demographics to determine how these may be related to cognitive style and grades. The D-2 students will be followed and assessed again during their 3rd as well as their 4th year.

RESULTS

The results of the GEFT indicated that the D-2 students as a whole (N = 66) were Field Independent regarding their cognitive learning style (Mean = 13.6). There were no statistically significant gender, racial or ethnic differences found concerning cognitive style.

For the first pre-clinical course taken by students, analysis of variance indicated that a significant relationship existed between the GEFT scores and course grades [$F(1,42) = 21.89$, $p = .0001$]. Students who were ranked in the upper third by course grades obtained the highest GEFT scores with a mean = 15 while students who were ranked in the lower third by course grades had a mean GEFT score of 10. Analysis of variance indicated a significant relationship also existed between cognitive style and class ranking for the second course [$F(1,43) = 23.24$, $p = .0001$] and for the third course [$F(1,49) = 6.67$, $p = .01$]. Students who were ranked in the upper third for both courses were the most field independent ($M = 16$ and $M = 15$ respectively).

Analysis of variance indicated that a significant relationship existed between student handedness (right vs left hand dominance)

and cognitive style [F (1,66 ) = 4.09, p = .05]. Being right handed was related to obtaining higher scores on the GEFT and thus classified as field independent. This result was particularly true for Black and Hispanic students.

Insert figure 1 about here

DISCUSSION

The GEFT facilitates identification of the cognitive learning styles of students. This allows the dental educator to capitalize on the preexisting cognitive style of FI students. It will also permit the dental educator to identify FD students and institute program changes which are designed to meet their unique learning needs.

Most dental students in the present study possessed a FI cognitive learning style. Previous research has shown that FI students are at an advantage in dental school particularly in performing preclinical and clinical psychomotor skills (Wilson et al., 1981). For example, a recent study demonstrated that FI dental students more quickly and accurately diagnosed dental radiographs (Wilson et al., 1988). Indeed, those students in the present study who were most FI did the best in the psychomotor component of their preclinical courses.

Analysis of the data raised additional questions which are beyond the scope of this paper. Interestingly, students with right hand dominance were found to be more FI, as measured by the GEFT, than students with left hand dominance. This observation raises an additional question as to whether hand dominance affects

psychomotor performance in dental courses. It is well known that there is a preponderance of right hand dominant people and this is also reflected in dental faculty. Perhaps this influences left hand dominant learners while they are attempting to model a psychomotor procedure which is being demonstrated by a right hand dominant instructor. Further research is indicated to probe this and other questions.

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# Figure 1.

## Handedness and Cognitive Style